

# Practice Exam

As with the Chapter Review Tests and the Final Exam, the Practice Exam tests your understanding of the materials underlying the learning objectives. After you've reviewed your answers to the Chapter Review Tests, try your hand at this 50-question Practice Exam to become still more comfortable with taking a multiple-choice test. Remember, topics covered in this exam may likewise be covered in the Final Exam, but the wording of the questions will never be identical.



1. The warm air distribution system that is usually located along the center line of the building is the:
  - a. balanced supply/return.
  - b. extended plenum.
  - c. perimeter loop.
  - d. perimeter radial.
  
2. (Fill in the blanks) Fernando needs to check the steam system at the point where the pressure is the highest. He should check the \_\_\_ where heat is \_\_\_.
  - a. boiler; added
  - b. boiler; removed
  - c. radiator; added
  - d. radiator; removed
  
3. Latent heat of fusion is the amount of heat required for a substance to change from a:
  - a. gas to a liquid.
  - b. liquid to a gas.
  - c. solid to a gas.
  - d. solid to a liquid.
  
4. One of the largest potential energy wasters in a steam distribution system is:
  - a. leaking steam traps.
  - b. faulty throttling valves.
  - c. air in the system.
  - d. uninsulated condensate lines.
  
5. You have been told that the cost of heating oil is increasing by 4%. If the current cost of oil is \$1.04, the new price will be:
  - a. \$1.43
  - b. \$1.16
  - c. \$1.08
  - d. \$1.04
  
6. The formula for the area of a circle is:
  - a.  $2 \times \pi \times R$ .
  - b.  $4 \div 3\pi \times R^3$ .
  - c.  $D \times \pi \div 2$ .
  - d.  $\pi \times R^2$ .

7. The boiler operator should watch at all times for all of the following **except**:
- leaks in steam, water, and fuel connections.
  - proper fuel air ration.
  - operating pressures and temperatures.
  - incoming water quality.
8. One advantage of hydronic heating over steam heating is:
- condensate returns are smaller.
  - less building damage may result from a leak.
  - pipng pitch or slope is not as critical.
  - pressure and temperature are easily controlled.
9. When steam or hot water is used as the heat source in a secondary warm air heating system, the system may be classified as a:
- direct-fired boiler.
  - fin-coil heat exchanger.
  - vertical forced air.
  - low-boy air.
10. Boilers that have hot gases circulating through tubes surrounded by water are called:
- firetube boilers.
  - high pressure boilers.
  - low pressure boilers.
  - watertube boilers.
11. The type of ventilation system that forces fresh air into the building by a fan and moves stale air out through outlets in outside walls or the roof is called:
- forced air.
  - makeup ventilation.
  - natural balancing pressure.
  - mechanical air intake/natural exhaust.
12. (Fill in the blank) A silver spoon placed in hot coffee quickly becomes too hot to handle. The spoon is heated by \_\_\_.
- conduction
  - convection
  - radiation
  - None of the above.

13. Boiler furnace explosions are likely to occur for all of the following reasons **except**:
- a. a weak pilot flame.
  - b. low fuel pressure.
  - c. insufficient combustion air.
  - d. insufficient purge of the furnace before startup.
14. All of the following boiler fittings are required on hot water heating boilers **except**:
- a. a pressure or altitude gauge.
  - b. a safety relief valve.
  - c. a shut-off valve.
  - d. a water gauge glass and column.
15. ABC company burns hydrocarbons to generate electricity for its operations. What are the two most common byproducts of hydrocarbon combustion?
- a. carbon monoxide and sulfur
  - b. carbon monoxide and water
  - c. carbon dioxide and sulfur
  - d. carbon dioxide and water
16. All of the following could cause a V-belt to fray, crack, or wear **except**:
- a. loose belt tension.
  - b. incorrect pulley sizes.
  - c. pulleys out of alignment.
  - d. shafts not parallel.
17. In all steam heating systems, the vertical steam supply pipes are called:
- a. risers.
  - b. returns.
  - c. upfeeds.
  - d. wet lines.
18. The **most** common cause of feeder or low-water fuel cut-off trouble is the operator's failure to observe the:
- a. blow-down instructions.
  - b. fuel calibration sequence.
  - c. water treatment limitations.
  - d. low-water control calibration.

19. If a pump sounds like it is pumping gravel, the most likely problem is:
- lack of balance.
  - worn bearings.
  - loose couplings.
  - cavitation.
20. A thermocouple used to detect the presence of a gas flame consists of:
- an infrared ray-emitting device.
  - a rod extending into the flame.
  - an ultraviolet ray-emitting device.
  - two wires of dissimilar metal welded together.
21. The lowest temperature at which condensation can be prevented in the flue gas passages of a hot water heating boiler is:
- 170°F.
  - 190°F.
  - 210°F.
  - 130°F.
22. The device that ensures that steam pressure will not force the boiler water back into the return line is a:
- condensate trap.
  - direct feed pump.
  - Hartford loop.
  - pressure regulator.
23. Two types of electric boilers are the electrode and the:
- immersion.
  - modified Scotch.
  - steel plate.
  - tubular.
24. A packing-type seal is designed to leak a small amount of liquid through the packing to:
- lubricate and cool the packing.
  - relieve system pressure.
  - check temperature of fluids.
  - keep air out of the system.

25. The directions on a bottle of cleaning fluid call for an 8:1 ratio of water to full-strength fluid. How many gallons of ready-to-use solution will one quart of full strength fluid yield? (1 gallon = 4 quarts)
- 2.0 gal.
  - 2.25 gal.
  - 8.25 gal.
  - 9.0 gal.
26. The greatest benefit of the dry method of laying up a boiler is it:
- prevents freezing.
  - minimizes corrosion.
  - minimizes oxidation.
  - eliminates off-season leaking.
27. The control used on gas- and oil-fired heating boilers to provide for proper sequencing of the combustion controls during startup and shutdown is the:
- limit control.
  - capacity control.
  - programming control.
  - safety control.
28. A volute is part of a:
- centrifugal pump.
  - gear pump.
  - hose pump.
  - plunger pump.
29. Some steam heating systems operate under a vacuum in order to:
- prevent steam leaks.
  - use steam with a temperature above 212°F.
  - use steam with a temperature below 212°F.
  - prevent air from entering the steam heating system.
30. The amount of heat necessary to convert 100 lbs. of ice at 32°F to water at 132°F is:
- 10,000 Btu.
  - 24,400 Btu.
  - 14,400 Btu.
  - 10,050 Btu.

31. The uneven expansion of cold metal when subjected to high heat is referred to as:
- stress fatigue.
  - thermal shock.
  - conduction cracking.
  - metallic heat failure.
32. The three fundamental units of measurement in physical mechanics are:
- acceleration, time, and mass.
  - length, width, and height.
  - time, length, and force.
  - time, velocity, and mass.
33. The smallest type of expansion tank is the:
- diaphragm expansion tank.
  - open expansion tank.
  - closed expansion tank.
  - conventional expansion tank.
34. The scale on a pressure gauge dial should be graduated with a range up to:
- $1\frac{1}{2}$  to 3 times the working pressure.
  - the maximum working pressure.
  - 5 times the working pressure.
  - $\frac{1}{2}$  the working pressure.
35. Trimming an impeller should result in a(n):
- reduction of noise.
  - decrease of power consumption.
  - improvement of a cavitation problem.
  - increase in pump horsepower.
36. The metric to USCS conversion factor for meters to feet is 3.281. Convert 20 meters to feet.
- 164.0 ft.
  - 72.9 ft.
  - 65.6 ft.
  - 6.1 ft.



37. All of the following are advantages of radiant heating panels **except**:
- a. system changes are easy to make.
  - b. heating elements are out of sight.
  - c. temperature distribution is more even.
  - d. buildings built on concrete slab are more comfortable.
38. The expansion tank should be located on the suction side of the pump to:
- a. control the loop temperature.
  - b. prevent clogs in the strainer.
  - c. avoid negative pressure in the system.
  - d. avoid excessive pressure in the system.
39. Insufficient positive draft could result in all the following **except**:
- a. burner overheating.
  - b. incomplete combustion.
  - c. dangers to environment for people.
  - d. increased carbon monoxide.
40. (Fill in the blank) A(n) \_\_\_ is formed when two straight lines intersect or cross at a common point.
- a. angle
  - b. axis
  - c. intercept
  - d. polygon
41. (Fill in the blanks) The organization's low-pressure heating boiler has failed. Without even checking it, the facility manager believes he knows the reason, as the **most** common cause of such failures is overheating of the \_\_\_ surface resulting from a \_\_\_ water condition.
- a. heating; high
  - b. heating; low
  - c. cooling; high
  - d. cooling; low

42. For facilities that require short-term operation where quick warm-up is required, the **least** responsive type of boiler to use is the:
- tubular boiler.
  - electrical boiler.
  - firetube boiler.
  - watertube boiler.
43. The **most** common type of firetube boiler used for heating large buildings is the:
- cast-iron.
  - high pressure.
  - modified Scotch.
  - modular.
44. The unit of measurement a compound pressure gauge uses to measure pressures below atmospheric pressure is:
- inches of mercury.
  - inches of water.
  - pounds per square inch.
  - pounds per square inch gauge.
45. Routine operation and maintenance of a hydronic heating system should include all the following **except**:
- confirming that automatic air vents are functional.
  - checking level of air cushion in expansion tank.
  - lubricating pump motors.
  - lubricating condensate pump.
46. A pump affects the pressure of a fluid or gas by:
- raising pressure.
  - reducing pressure.
  - regulating pressure.
  - stabilizing pressure.

47. The steam boiler component used to lower the concentration of dissolved impurities in the boiler water is the:
- blow-off connection.
  - deconcentrator.
  - feed connection.
  - sediment reduction valve.
48. To reduce corrosion in large hydronic heating systems, a gas cushion is recommended in the expansion tank consisting of:
- oxygen.
  - hydrogen.
  - nitrogen.
  - soluble gas.
49. What is the maximum allowable working pressure of a boiler during hydrostatic testing?
- 100%
  - 125%
  - 150%
  - 200%
50. If a 20-tooth pinion is turning at 120 rpm and the driven gear has 60 teeth, the driven gear is turning at:
- 1 rpm.
  - 30 rpm.
  - 40 rpm.
  - 360 rpm.



# Practice Exam Answers

- |     |   |     |   |
|-----|---|-----|---|
| 1.  | B | 26. | A |
| 2.  | A | 27. | C |
| 3.  | D | 28. | A |
| 4.  | A | 29. | C |
| 5.  | C | 30. | A |
| 6.  | D | 31. | B |
| 7.  | D | 32. | C |
| 8.  | C | 33. | A |
| 9.  | B | 34. | A |
| 10. | A | 35. | B |
| 11. | D | 36. | C |
| 12. | A | 37. | A |
| 13. | B | 38. | C |
| 14. | D | 39. | A |
| 15. | D | 40. | A |
| 16. | B | 41. | B |
| 17. | A | 42. | C |
| 18. | A | 43. | C |
| 19. | D | 44. | A |
| 20. | D | 45. | D |
| 21. | A | 46. | A |
| 22. | C | 47. | A |
| 23. | A | 48. | C |
| 24. | A | 49. | C |
| 25. | B | 50. | C |